U.S. FISH AND WILDLIFE SERVICE
SPECIES ASSESSMENT AND LISTING PRIORITY ASSIGNMENT FORM

SCIENTIFIC NAME: *Oceanodroma castro*

COMMON NAME: Band-rumped storm-petrel (Hawaii Distinct Population Segment)

LEAD REGION: Region 1

INFORMATION CURRENT AS OF: April 2010

STATUS/ACTION

___ Species assessment - determined we do not have sufficient information on file to support a proposal to list the species and, therefore, it was not elevated to Candidate status
___ New candidate
_X_ Continuing candidate
___ Non-petitioned
_X_ Petitioned - Date petition received: May 8, 1989, and May 11, 2004
X 90-day positive - FR date: September 21, 1989
X 12-month warranted but precluded - FR date: May 11, 2005
N Did the petition request a reclassification of a listed species?

FOR PETITIONED CANDIDATE SPECIES:
a. Is listing warranted (if yes, see summary of threats below)? Yes
b. To date, has publication of a proposal to list been precluded by other higher priority listing actions? Yes
c. If the answer to a. and b. is "yes", provide an explanation of why the action is precluded.
Higher priority listing actions, including court-approved settlements, court-ordered and statutory deadlines for petition findings and listing determinations, emergency listing determinations, and responses to litigation, continue to preclude the proposed and final listing rules for the species. We continue to monitor populations and will change its status or implement an emergency listing if necessary. The "Progress on Revising the Lists" section of the current CNOR (*http://endangered.fws.gov/*) provides information on listing actions taken during the last 12 months.

_N_ Listing priority change
Former LP: ___
New LP: ___
Date when the species first became a Candidate (as currently defined): October 25, 1999

___ Candidate removal: Former LPN: ___
___ A – Taxon is more abundant or widespread than previously believed or not subject to the degree of threats sufficient to warrant issuance of a proposed listing or

continuance of candidate status.

___U – Taxon not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status due, in part or totally, to conservation efforts that remove or reduce the threats to the species.

___ F – Range is no longer a U.S. territory.

___ I – Insufficient information exists on biological vulnerability and threats to support listing.

___ M – Taxon mistakenly included in past notice of review.

___ N – Taxon does not meet the Act's definition of "species."

___ X – Taxon believed to be extinct.

ANIMAL/PLANT GROUP AND FAMILY: Birds, Family Hydrobatidae (Storm-petrels)

HISTORICAL STATES/TERRITORIES/COUNTRIES OF OCCURRENCE: Hawaii (probably all main Hawaiian Islands and perhaps French Frigate Island)

CURRENT STATES/COUNTIES/TERRITORIES/COUNTRIES OF OCCURRENCE: Hawaii (Islands of Kauai, Hawaii, Maui, Lanai, Kahoolawe, and Lehua)

LAND OWNERSHIP: The majority of the breeding colonies are located on State-owned lands on the island of Kauai. Another breeding colony likely exists on Lehua Islet, which is federally owned by the U.S. Coast Guard. Other, smaller colonies possibly exist on Federal land on Maui, and on State, Federal, and private lands on the islands of Hawaii, Lanai, and Kahoolawe.

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BIOLOGICAL INFORMATION

Species Description

The band-rumped storm-petrel (*Oceanodroma castro*) is a small seabird about 8 inches (20 centimeters) long. It is an overall blackish-brown bird with a white rump. Sexes are alike in size and appearance. The species is long-lived (15-20 years) and probably does not breed until its third year (Ainley 1984). Field identification can be difficult because several other species of storm-petrels are similar in size, color, and shape; however, vocalizations at breeding colonies are distinctive and can be used to identify the species (Allan 1962; James and Robertson 1985).

Taxonomy

Band-rumped storm-petrel specimens were collected by naturalists visiting Hawaii during the 1800s, but were not recognized as *Oceanodroma castro* until the early 1900s (Henshaw 1902). Prior to 1900, the Hawaiian bird had been described as an "unnamed petrel" in the genus *Thalassidroma* (Dole 1869, 1879), as *Cymochorea cryptoleucura* (Ridgeway 1882), and as

Oceanodroma cryptoleucura (Stejneger 1888). After Henshaw's 1902 publication, the Hawaiian population was commonly known as *O. castro cryptoleucura*, the Hawaiian storm-petrel (Harrison *et al*. 1990). Other common names for this species are the Harcourt's or Madeiran storm-petrel. Native Hawaiian names for the bird include oeoe, oweowe, and akeake (Harrison *et al*. 1990).

Although the Hawaiian population was previously recognized as a distinct subspecies, taxonomists today generally combine the various Pacific populations into a single taxon. Austin (1952) examined eleven museum skins from the Hawaii population and studied the taxonomy of the band-rumped storm-petrel and concluded that, although the various populations exhibited minor size differences, these differences were not significant and the populations were best considered as belonging to a single species with no separable subspecies. After examining a series of specimens, Harris (1969) likewise concluded that, although the species showed considerable variation among populations, the differences did not warrant recognition as subspecies. The American Ornithologists' Union (AOU) currently regards the species as monotypic with no recognized subspecies (AOU 2007). We have carefully reviewed the available taxonomic information and have concluded the species is a valid taxon.

Habitat/Life History

When not at nesting sites, adults spend their time foraging on the open ocean (Crossin 1974; Ainley 1984). In the Hawaiian Islands, this species nests in remote cliff locations on Kauai and Lehua Islet and in high-elevation lava fields on Hawaii (Banko *et al*. 1991; Wood *et al*. 2002; VanderWerf *et al*. 2007; D. Hu, National Park Service (NPS), pers. comm. 2005). Only three inactive nests have been found in the Hawaiian Islands, one in a small lava tube at 8,500 feet (ft) (2,591 meters (m)) elevation on the southeastern slope of Mauna Loa volcano on Hawaii (D. Hu, pers. comm. 2005), one on a sheer cliff in remote Pohakuao Valley on the Na Pali coast of Kauai (Wood *et al*. 2002), and one in a small cave on Lehua Islet, which is located 0.6 miles (mi) (1 kilometers (km)) north of Niihau (VanderWerf *et al*. 2007). All nests were located in small caves or crevices, and were confirmed to be nests of this species by skeletal remains found in the nest. No other nests have been found despite intensive searching (Slotterback 2002). In other areas, nests are placed in crevices, holes, and protected ledges along cliff faces, where a single egg is laid (Allan 1962; Harris 1969; Slotterback 2002). Adults visit the nest site after dark, where they can be detected by their distinctive calls. In Hawaii, the nesting season occurs during the summer months, with adults establishing nesting sites in April or May. The incubation period averages 42 days (Harris 1969) and the young reach fledging stage in 64 to 70 days (Allan 1962; Harris 1969). Food is taken from the ocean surface and consists mostly of small fish, squid, crustaceans, oily scraps of marine animal carcasses, and garbage remnants (King 1967; Harris 1969).

Historical Range/Distribution

The band-rumped storm-petrel probably was common on all of the main Hawaiian Islands when aboriginal Polynesians arrived about 1,500 years ago (Berger 1972; Pyle 1984; Harrison *et al*. 1990). As evidenced by abundant storm-petrel bones found in middens on the island of Hawaii (Harrison *et al*. 1990), and in excavation sites on Oahu and Molokai (Olson and James 1982), band-rumped storm-petrels once were very numerous and nested in sufficiently accessible sites,

including coastal areas, to be used as a source of food and possibly feathers (Harrison *et al*. 1990). They were also known from French Frigate Island (Henshaw 1902).

Current Range/Distribution

The band-rumped storm-petrel is found in several areas of the subtropical Pacific and Atlantic Oceans (Harris 1969). In the Pacific, there are three widely separated breeding populations--one in Japan, one in Hawaii, and one in the Galapagos (Richardson 1957; Harris 1969).

In Hawaii, band-rumped storm-petrels currently are known to nest only in remote cliff locations on Kauai and Lehua Islet, and in high-elevation lava fields on Hawaii (Wood *et al*. 2002; D. Hu, pers. comm. 2005; VanderWerf *et al*. 2007). Vocalizations of the species were heard in Haleakala Crater on Maui in 1992 (S. Johnston, U.S. Fish and Wildlife Service (Service), *in litt*. 1992a), and more recently in 2006 (G. Ackerman, NPS, pers. comm. 2006). Given the current scarcity of breeding colonies in Hawaii and their remote, inaccessible locations compared to prehistoric population levels, the band-rumped storm-petrel was significantly reduced in numbers and range following settlement of the Hawaiian Islands by aboriginal Polynesians. This likely was the beginning of a decline in the band-rumped storm-petrel population that has continued to the low numbers found today in the Hawaiian Islands.

The Japanese population, which breeds on islets off the east coast of Japan, appears to range mostly east and south of Japan (Harrison 1983), but occurs only within about 860 mi (1,400 km) of the breeding colonies. The absence of records from western Micronesia (Pyle and Engbring 1985) suggests there is a distributional gap between the Japanese and Hawaiian populations. However, the scarcity of observations in this part of the Pacific could also reflect a lack of survey effort.

Atlantic breeding populations are restricted to the eastern portions of the ocean, primarily in the Azores Island group off northwestern Africa (Cramp and Simmons 1977). Wintering birds from this population may occur as far west as the mid-Atlantic, with small numbers reaching the coasts of North and South America (Cramp and Simmons 1977). The Atlantic breeding populations are not within the borders of the United States (U.S.) or under U.S. jurisdiction.

Both the Atlantic and Pacific band-rumped storm-petrels are most commonly found in close proximity to breeding islands (King 1967). The three populations in the Pacific are separated by long distances across the ocean where birds are not found continuously. Pitman (1986) found virtually no records of birds of the Galapagos outside the immediate area of the Galapagos Islands. Extensive at-sea surveys of the Pacific have revealed a broad gap in distribution of the band-rumped storm-petrel to the east and west of the Hawaiian Islands (Pitman 1986; Spear *et al*. 1994), indicating the distribution of birds in the central Pacific around Hawaii is disjunct from other nesting areas.

Population Estimates/Status

Populations in Japan and the Galapagos are comparatively large and number in the thousands (Coulter 1984; Hasegawa 1984), while the Hawaiian birds represent a small, remnant population of possibly only a few hundred pairs (Harrison *et al*. 1984; Harrison *et al*. 1990). The Hawaiian

population of the band-rumped storm-petrel is the only population within U.S. borders or under U.S. jurisdiction. Spear *et al*. (1994) estimated that perhaps as many as 5,500 birds occur in the eastern and central tropical Pacific, with a concentration near the Marshall Islands, but the origin of these birds is not clear.

Evidence of extant nesting populations of band-rumped storm-petrels in the Hawaiian Islands is based on auditory detection of adult birds during breeding season surveys and by retrieval of fledglings in the fall. Band-rumped storm-petrels, as with other storm-petrels, make very distinctive calls during the breeding season as they approach their nesting colonies. These calls can be detected during nocturnal surveys and used to locate and identify nesting colonies. Fledglings have been retrieved on the islands of Hawaii and Kauai, and provide additional evidence of nesting colonies within the Hawaiian archipelago (Harrison *et al*. 1990).

On Hawaii, band-rumped storm-petrels nest in barren lava fields above 7,000 ft (2,130 m) elevation; on Kauai and Lehua Islet they nest on rocky cliffs (Wood *et al*. 2002, VanderWerf *et al*. 2007).

Band-rumped Storm-petrels are regularly reported in coastal waters around Kauai, Niihau, and Hawaii, including reports of regular concentrations of storm-petrels at various distances offshore from possible nesting colonies (Harrison *et al*. 1990; VanderWerf *et al*. 2007; D. Kuhn, pers. comm. 2007). These "rafts," which number from a few birds to perhaps a hundred, may be birds awaiting nightfall before coming ashore to the breeding colonies. A database of bird observations maintained at the Bishop Museum in Honolulu contains 39 reports of the species in Hawaii since 1995, with 30 of them from Kauai (R. Pyle, Bishop Museum, pers. comm. 2005). The largest number reported was 27 birds on 28 July 1993 from the Kaulakahi Channel between Kauai and Niihau. An individual who takes regular boat trips across the Kaulakahi Channel to Lehua Islet reported seeing the species on 19 occasions between April 1998 and August 2005. The largest numbers seen at one time were 18 individuals, which were observed in June 2000 and June 2005 each (D. Kuhn, pers. comm. 2007). Concentrations of birds found near the equator south of the Hawaiian Islands and in the Marshall Islands (Spear *et al*. 1994), may be part of the Hawaiian population, but assignment of these birds to an exact breeding location is speculative.

More information is needed to identify locations where management actions could be best implemented, and field surveys are needed to monitor the adequacy of any management actions implemented. Annual surveys could be conducted in known nesting areas by listening for birds as they return at night, by use of marine radar, or by surveys at sea to identify concentrations of birds that may form offshore from nesting areas.

Kauai

Kauai likely has the largest population of band-rumped storm-petrels in the Hawaiian Islands (Harrison *et al*. 1990). Breeding bird surveys on Kauai in 1992 by the Service (S. Johnston, *in litt*. 1992b) detected a few band-rumped storm-petrels along the northern shore in Nualolo Valley. Harrison *et al*. (1990) reported many band-rumped storm-petrels on the southern and southwestern side of Kauai at the mouths of Waimea Canyon and Hanapepe Valley, and

suggested that the island of Kauai has the largest population in the islands. Harrison *et al*. (1990) concluded that band-rumped storm-petrels probably nested along the cliffs of these two valleys and elsewhere on the island. A search of Hanapepe Valley in 1980 by J. Sincock revealed what appeared to be burrows, feathers, and feces on the cliff face 165-230 ft (50-70 m) from the top of the cliff (Harrison *et al*. 1990). In 1992, almost the same location was occupied by common mynas (*Acridotheres tristis*), and band-rumped storm-petrels were not heard during nocturnal surveys (S. Johnston, *in litt*. 1992b). Crossin (1974) found band-rumped storm-petrels off the southern coast of Kauai but speculated that the population on the island "cannot be large."

Surveys in 2002 by Wood *et al*. (2002) revealed what appear to be nesting populations in six locations, including one in Waimea Canyon east of Waimea Canyon lookout, four populations along the Na Pali Coast (Kalalau, Pohakuao, Nuololo Aina, and Nuololo Kai), and one at the eastern rim of Nuololo and Awaawapuhi Valleys (accessed from the Awaawapuhi Trail in Kokee State Park). Three other sites were monitored and appear to be areas where the petrels are in transit to nearby nesting areas, including upper Waimea Canyon; Honopu (Kokee State Park); and Kalalau Rim (Kokee State Park). Wood *et al*. (2002) estimated there were 171-221 nesting pairs on Kauai. In 1992, K. Wood rapelled down the cliff face to an area where nests were suspected to be in Pohakuao and recovered the remains of a small seabird from a small cave o the cliff face. The bones were compared with skeletal specimens at Bishop Museum by former Service biologist Eric VanderWerf and identified as those of a band-rumped storm-petrel, making this the first confirmed nest site for this species in the Hawaiian Islands. Rat bones also were collected from the same site, indicating that even these sheer cliffs are subject to rat predation (Wood *et al*. 2002). Auditory surveys by K. Wood and others in 2004 and 2005 detected 43 to 45 birds at the Pohakuao site, and 81 birds at the Nuololo/Awaawapuhi site (K. Wood, National Tropical Botanical Garden (NTBG), pers. comm. 2005).

From 2006-2008, surveys were conducted as part of the Kauai Endangered Seabird Recovery Project, a collaborative effort between the Division of Forestry and Wildlife (State of Hawaii Department of Land and Natural Resources), Pacific Cooperative Studies Unit (University of Hawaii) and the US Fish and Wildlife Service (Holmes and Joyce 2009 pg 1). The following is taken directly from Joyce and Holmes 2010 as a write up of the survey data.

Sites:

Hololu'u: A single survey conducted at the eastern end of this small hanging valley on the Napali coast between Hanakapiai and Hanakoa Streams revealed frequent calling from an area surrounding a prominent buttress above "Spaceship Rock" on the Kalalau trail.

Hanakoa: Small numbers of calls noted from cliffy buttresses at the edges of Hanakoa Valley.

Kalalau: Extensive surveys along ridges within the Kalalau Valley reveal extensive band-rumped storm-petrel use of steep sparsely vegetated cliffs along both walls of the valley. Particular concentrations were recorded near the entrance to the Valley and in a cliffy buttress extending from the western wall.

Nakeikionaiwi: Frequent calling from the lower fluted cliffs of this small hanging valley above Kalalau Beach indicate a moderate number of band-rumped storm-petrel using this valley.

Honopu: Surveys along the southwest rim of Honopu Valley revealed frequent (nearly continuous) band-rumped storm-petrel calling from a diffuse area surrounding the observers. It was not clear which cliff band was being occupied.

Nualolo: Surveys conducted along the south rim of Nualolo Aina reveal extensive use of the upper fluted cliffs.

Milolii: Suve on the south rim of Milolii Valley recorded frequent calling and circling in this narrow slot valley.

Makaha/Kauhoa: Surveys along the rims of these dry valleys on the Kona side of Kauai reveal moderate levels of calling activity.

Waimea Canyon: Surveys conducted along the western rim of Waimea Canyon complex and along buttresses in the Waipoo, Kohua, Poomau, and Mohihi Canyons, revealed localized areas of low level band-rumped storm-petrel calling activity.

Wainiha Valley: A single individual detected repeatedly calling near an exposed cliff band from the rim of Wainiha Valley over 10 km from the coast.

Haupu: Small numbers of calls recorded near cliff bands at the base of the Haupu range near the southeast coast of Kauai.

Kahili: Two isolated calls recorded near an exposed cliff formation on Kahili Mountain in the southern quadrant of Kauai.

Lehua Islet

In February 2002, the skull of a juvenile storm-petrel was collected from a small cave on Lehua Islet, which is located 0.6 mi (1 km) north of Niihau and 19 mi (31 km) southwest of Kauai (VanderWerf *et al*. 2007). The skull did not closely match any storm-petrel species in the reference collection at Bishop Museum, but the skull was from a young bird and was not fully developed, perhaps confounding the identification. The specimen was sent to Dr. David Steadman for examination, who determined that it was not Leach's storm-petrel (*O. leucorhoa*), but was not able to conclusively determine the species either. On 6 July 2002, VanderWerf *et al*. (2007) heard band-rumped storm-petrel calls on the outer slope of Lehua Islet on three occasions. On 1 June 2003, six birds were observed circling off the western tip of the islet at dusk, and the calls of a single bird were heard on the tip of the islet (VanderWerf *et al*. 2007). Because band-rumped storm-petrels were subsequently observed on Lehua Islet, it is most likely that the skeletal specimen is of that species.

Hawaii

Band-rumped storm-petrels have been detected in several areas on the slopes of Mauna Loa

volcano from 6,000-10,000 ft (1,830-3,050 m) elevation (Banko *et al*. 1991; D. Hopper, University of Hawaii at Manoa, pers. comm. 1993; D. Hu, pers. comm. 2005; D. Hu, pers. comm. 2007), but only in small numbers. The remains of two adults were found in April 1994 outside a small lava tube at 8,500 ft (2,591 m) elevation on the southeastern flank of Mauna Loa. Both birds had been depredated, probably by a cat, and presumably were attempting to nest in the lava tube. Calls of this species were regularly heard in this area in 2004 and 2005, and one bird was accidentally caught in a mist-net in August 2003. Storm-petrels have also been heard on the eastern slope of Mauna Loa near the Keauhou Ranch boundary, and on the western slope above Hawaiian Ocean View Estates (D. Hu, pers. comm. 2005). The remains of a dead band-rumped storm-petrel were found under a power line along the road leading to the atmospheric observatory on the northern slope of Mauna Loa on September 3, 2001 (D. Hu, pers. comm. 2005). Surveys of other portions of the island failed to discover any birds, even with the use of marine radar and night-vision optics (Cooper *et al*. 1996, Reynolds *et al*. 1997).

Kahoolawe

Olson (1992) reported the historical presence of band-rumped storm-petrels on Kahoolawe and speculated that the species may still exist there; however, rat populations on this island likely would limit populations to inaccessible locations.

Maui

On Maui, band-rumped storm-petrels were detected during breeding season surveys at Haleakala Crater in 1992 (S. Johnston, *in litt*. 1992a). This survey confirmed past records of a small number of storm-petrels vocalizing during the breeding season at this location (Pyle 1984; Harrison *et al*. 1990). In addition, Haleakala National Park personnel detected at least one band-rumped storm-petrel during an overnight stay in the Crater in 1992 (C. Bailey (formerly Natividad-Hodges), NPS, pers. comm. 1992). Most recently, in 2006, NPS personnel conducting Hawaiian hoary bat (*Lasiurus cinereus semotus*) surveys in Haleakala Crater visually observed band-rumped storm-petrels in flight (G. Ackerman, pers. comm. 2007). Despite extensive work in the dark-rumped petrel colonies within Haleakala National Park, no band-rumped storm-petrel nest sites have ever been located (C. Bailey, pers. comm. 2007).

Recent breeding season surveys on Hawaii (D. Hu, pers. comm. 2005), Kauai (Wood *et al*. 2002; Wood, pers. comm. 2005) and Lehua Islet (VanderWerf *et al*. 2007), as well as reports of fledglings picked up on Hawaii (Harrison *et al*. 1990; Banko *et al*. 1991) and Kauai (Harrison *et al*. 1990), and the recent observation of band-rumped storm-petrels within Haleakala Crater on the island of Maui (G. Ackerman, pers. comm. 2007) confirm that remnant populations still exist on these islands. It is not possible to determine if they are viable, but they certainly are not large and represent only a fraction of pre-historic distribution.

DISTINCT POPULATION SEGMENT (DPS)

The definition of "species" in section 3(15) of the Endangered Species Act (Act) includes any distinct population segment(s) of any species of vertebrate fish or wildlife that interbreed when mature. For a population to be listed under the Act as a distinct vertebrate population segment, three elements are considered--1) the discreteness of the population segment in relation to the remainder of the species to which it belongs, 2) the significance of the population segment to the

species to which it belongs, and 3) the populations segment's conservation status in relation to the Act's standards for listing (i.e., is the population segment, when treated as if it were a species, endangered or threatened?) (61 FR 4722).

The available information indicates that distinct populations of band-rumped storm-petrels are definable and that the distinct population segment of band-rumped storm-petrel in the Hawaiian Islands is discrete in relation to the remainder of the species as a whole. The population segment is distinct based on geographic and distributional isolation from other band-rumped storm-petrel populations in Japan, the Galapagos Islands, and the Atlantic Ocean. A population also can be considered "discrete" if it is delimited by international boundaries across which exist differences in management control of the species. The Hawaiian Islands population of the band-rumped storm-petrel is the only population within U.S. borders or under U.S. jurisdiction.

A population segment is considered "significant" if its loss would constitute a significant gap in the range of the taxon. As discussed above, the Hawaiian Islands population constitutes the Central Pacific distribution of band-rumped storm-petrels between the Galapagos and Japan populations. The loss of this population would cause a significant gap in the distribution of the band-rumped storm-petrel in the Pacific, and could result in the complete isolation of the Galapagos and Japan populations without even occasional genetic exchanges. Based on the discreteness and significance of the Hawaiian Islands population, the Service considers it to be a distinct vertebrate population segment which warrants review for listing under the Act.

Both the Atlantic and Pacific band-rumped storm-petrels are most commonly found in close proximity to breeding islands (King 1967). Pitman (1986) found virtually no records of birds of the Galapagos outside the immediate area of the Galapagos Islands. The Japanese population is over 4,000 mi (6,400 km) west of Hawaii, and the Galapagos population is a similar distance to the southeast. At-sea surveys of the Pacific have revealed a broad gap in distribution of the band-rumped storm-petrel to the east and west of the Hawaiian Islands (Pitman 1986; Spear *et al*. 1994), indicating the distribution of birds in the central Pacific around Hawaii is disjunct from other nesting areas.

The band-rumped storm-petrel demonstrates high fidelity to nest chambers, suggesting genetic isolation of colonies (Allan 1962; Harris 1969). The actual degree of genetic isolation of the Hawaiian population is not known, and it is not likely that any genetic studies will be completed soon. A limited amount of dispersal, restricted mostly to pre-breeding young, may occur. Harris (1969) states that populations are "probably distinct with little mixing." Investigation of the genetic relationships of the Hawaiian dark-rumped petrel (*Pterodroma phaeopygia sandwichensis*), a related species with similarly disjunct breeding populations in the Galapagos and Hawaii, has shown no genetic interchange between the two locations (Browne *et al*. 1997). Browne *et al*. (1997) concluded that if one of the Pacific populations is lost, natural recolonization following from the other population is unlikely.

THREATS

A. The present or threatened destruction, modification, or curtailment of its habitat or range.
The rocky cliffs where band-rumped storm-petrels nest on Kauai are too steep for development, and there is no development in the higher elevation lava fields on Mauna Loa, Hawaii, where storm-petrel colonies are believed to occur. Feral goats forage along some cliffs where nests occur on Kauai and may trample nests and increase erosion (Scott *et al*. 1986; Tomich 1986). Feral rabbits (*Oryctolagus cuniculus*), although very recently eradicated from the island (Island Conservation, *in litt*. 2007; C. Swenson, Service, pers. comm. 2007), were abundant on Lehua Islet and may have decreased vegetative cover and increased erosion of nesting sites (Norman 1988; Abbott *et al.* 2000; Service and DOFAW 2005).

The goat, a species originally native to the Middle East and India, was successfully introduced to the Hawaiian Islands in 1792. Currently, populations exist on Kauai, Oahu, Maui, Molokai, and Hawaii. Goats browse on introduced grasses and native plants, trample roots and seedlings, cause erosion, and promote the invasion of alien plants. Goats are able to forage in extremely rugged terrain and have a high reproductive capacity (Clarke and Cuddihy 1980; van Riper and van Riper 1982; Scott *et al*. 1986; Tomich 1986; Culliney 1988; Cuddihy and Stone 1990). Goats are present on Kauai and Maui and may trample band-rumped storm-petrel burrows and/or cause rockslides that bury the burrows.

The European rabbit, native to Spain and southern France, is now found on every continent except Antarctica, and has been observed on over 800 islands in every major ocean (Flux and Fullagar 1992). In Hawaii, they were first introduced to Ford Island in Pearl Harbor, Oahu, and later released on Molokini (near Maui), Manana (near Oahu), Lehua, Laysan, Lisianski, and Pearl and Hermes Atoll (Tomich 1986; Wood *et al*. 2004). They have since been eradicated from Pearl and Hermes, Laysan, and Manana, and have disappeared naturally from Lisianski and Molokini (Wood *et al*. 2004). They were recently eradicated from Lehua (C. Swenson, pers. comm. 2007; Island Conservation *in litt*. 2007).

B. Overutilization for commercial, recreational, scientific, or educational purposes.
None known.

C. Disease or predation.
Introduced predators are the most serious threat facing the band-rumped storm-petrel. The Polynesian rat (*Rattus exulans*) was introduced to the Hawaiian Islands by Polynesians prior to the arrival of Europeans, and a number of additional predators have been introduced since the arrival of Europeans, including the domestic cat (*Felis catus*), small Indian mongoose (*Herpestes auropunctatus*), common barn owl (*Tyto alba*), black rat (*R. rattus*) and Norway rat (*R. norvegicus*). These predators are found throughout the main Hawaiian Islands, with the exception of the mongoose, which is not established on Kauai (Scott *et al*. 1986; Tomich 1986; Harrison *et al*. 1990; Slotterback 2002; K. Wood, pers. comm. 2005).

The effect of these predators on the band-rumped storm-petrel is likely devastating. Evidence from the islands of Hawaii and Maui show that the Hawaiian dark-rumped petrel, which nests in

some of the same areas as the band-rumped storm-petrel, suffers huge losses to introduced predators (S. Johnston, *in litt*. 1992a; Hodges and Nagata 2001; Hu *et al*. 2001). Population modeling of the Hawaiian dark-rumped petrel indicates that predation levels as low as 10 percent in a single season would require a recovery period of at least seven years (Natividad-Hodges 1994). The effects of introduced predators on the breeding success of Hawaiian dark-rumped petrels are probably similar to the effects on band-rumped storm-petrel breeding success because these birds are equally vulnerable and nest in the same areas. Rat bones were collected from a band-rumped storm-petrel nest on a sheer cliff on Kauai and 2 live rats were observed walking along the tiny rock ledges in the area (Wood *et al*. 2002), demonstrating that even remote, inaccessible sites are not safe from these voracious predators. The remains of a band-rumped storm-petrel that appeared to have been predated by a barn owl were found in 2004 at Awaawapuhi, Kauai (K. Wood, pers. comm. 2005).

Predation by introduced species has played a significant role in reducing storm-petrel numbers and in exterminating colonies in the Pacific and other locations worldwide (Moors and Atkinson 1984; Flint 1999). In New Zealand, petrel species are common on islands free of Polynesian rats, but are rare or absent on neighboring islands inhabited by this predator (Robertson and Bell 1984). Small ground nesting and burrow nesting seabirds such as storm-petrels, as well as their eggs and young in such nests, are highly susceptible to predation by rats and other mammalian predators larger than mice (Flint 1999). The band-rumped storm-petrel is relatively small in size, lacks effective anti-predator behavior, and has a lengthy incubation and fledgling period, making the species highly vulnerable to predation by introduced mammals.

There have been no studies conducted on the impact of disease in band-rumped storm-petrels, and the significance of disease as a factor limiting the population is presently unknown. However, avian diseases, particularly avian malaria (*Plasmodium relictum capistranoae*) and avian pox (*Poxvirus avium*), both of which are transmitted by the southern house mosquito (*Culex quinquefasciatus*), have had a devastating effect on endemic Hawaiian forest birds, many of which have little resistance to introduced diseases (van Riper *et al*. 1986; Atkinson *et al*. 1995). Avian pox causes lesions on the feet, legs, and bills, and is transmitted by physical contact with an infected bird or through bites by mosquitoes carrying the disease.

D. <u>The inadequacy of existing regulatory mechanisms</u>.

The band-rumped storm-petrel is currently protected under Federal law by the Migratory Bird Treaty Act (MBTA) (16 U.S.C. 703-712). The MBTA regulates most aspects of take, possession, transport, sale, purchase, barter, export, and import of migratory birds including the band-rumped storm-petrel. These regulations prohibit the killing, capturing, and collecting of individuals, eggs, and nests unless such action is authorized by permit. While the MBTA does prohibit actions that directly kill a covered species, unlike the Endangered Species Act, it does not prohibit habitat modification that indirectly kills or injures a covered species. Therefore, the MBTA affords no habitat protection when the birds are not present.

The Hawaiian population of the band-rumped storm-petrel is listed by the State of Hawaii as an endangered species under Hawaii State Endangered Species Act (Hawaii ESA) (Hawaii Revised Statutes (HRS), Sect. 195D-4(a)). The Hawaii ESA prohibits take, possession, sale, transport, or

export of adults, eggs, or young, except as authorized by law, license, or permit. Like the MBTA, the Hawaii ESA affords no protection of habitat.

Although these regulations offer significant protection if storm-petrels were taken for commercial, recreational, or other reasons, they contribute minimally to the active management and recovery of a species. The chance of implementing conservation measures that would lead to recovery of the species would be improved if the band-rumped storm-petrel were federally listed as endangered. As a species covered under the Act, the band-rumped storm-petrel would benefit from an approved recovery plan that would guide recovery efforts, identify responsible agencies, and support agencies in obtaining funding for needed recovery actions. Further, the State may enter into agreements with Federal agencies to administer and manage any area required for the conservation, management, enhancement, or protection of endangered species (HRS, Sect. 195D-5(c)). Funds for these activities could be made available under section 6 of the Federal Endangered Species Act (via State Cooperative Agreements). Listing of this species would therefore reinforce and supplement the protection available under State law. Since many of the band-rumped storm-petrels may nest on National Park Service lands, the provisions of section 7 of the Act would be applied to any actions authorized, funded, or conducted by the National Park Service that may affect the band-rumped storm-petrel.

E. Other natural or manmade factors affecting its continued existence.

A significant impact to the band-rumped storm-petrel results from the effects of artificial lights on fledgling young and, to a lesser degree, adults. Artificial lighting of roadways, resorts, ballparks, residences, and other development in lower elevation areas, as well as cruise ships out at sea, both attracts and confuses night-flying storm-petrel fledglings and other seabirds, resulting in "fall-out" (Harrison *et al*. 1990; Reed *et al*. 1985; Telfer *et al*. 1987; Planning Solutions 2003; F. Duvall, pers. comm. 2008) and collisions with buildings and other objects (Banko *et al*. 1991). Artificial lights modify the night sky through which the fledgling birds must navigate after leaving the nest to reach the open sea. Over a 12-year period from 1978 to 1990, Harrison *et al*. (1990) reported that 15 band-rumped storm-petrels, 13 of which were young, were recovered on Kauai as a result of fall-out. Between 1991 and 2008 another 21 band-rumped storm petrels were collected on Kauai according to the Department of Land and Natural Resources Save Our Shearwater database (Holmes and Joyce 2009 pg. 2). The actual extent of such loss and its overall impact on the population is not known because scavengers prevent the majority of fall-outs from being detected, but any loss in such a small population is significant.

A related threat to band-rumped storm-petrels and other seabirds in Hawaii is collisions with communication towers and utility lines (Cooper and Day 1998; Podolsky *et al*. 1998; Planning Solutions 2003). Several seabird species that nest in the Hawaiian Islands, including Newell's shearwater, Hawaiian petrel, and band-rumped storm-petrel regularly commute between inland nest sites and the ocean. These birds commute at night when unnatural obstacles such as communication towers and utility lines are difficult to see. Birds may strike these unseen obstacles, often resulting in injury and death. The remains of a dead band-rumped storm-petrel were found under a power line along the road to the atmospheric observatory on the northern slope of Mauna Loa on September 3, 2001 (D. Hu, pers. comm. 2005). The impact from artificial lighting and collisions with communication towers, utility wires, and other structures is

expected to increase as the human population grows and development continues on Kauai and other Hawaiian Islands. The human population of Kauai increased by 14 percent from 1990 to 2000 (U.S. Census Bureau 2000).

Unstudied factors that could threaten the band-rumped storm-petrel include commercial fisheries interactions and alteration of the prey base upon which the storm-petrel depends. Commercial fisheries are known to adversely affect certain species of seabirds (Furness and Ainley 1984). Prey items taken by the storm-petrel are small, and there are no commercial fisheries that are known to compete directly for this resource. However, the potential effects of large drift nets, purse seines, long lines, and other fishing methods on this species have not been assessed.

Pollution of the open oceans by plastics and other debris that can be mistaken as food by storm-petrels also may pose a threat to the population (Harrison *et al*. 1990). Although a study by Spear *et al*. (1995) found no evidence of plastic ingestion by band-rumped storm-petrels, the sample size was small and inadequate to conclusively determine whether this species suffers from ingestion of plastics. Many closely related seabirds did suffer ill effects from plastic ingestion. The effects of plastic ingestion include physical damage to the digestive tract and the introduction of toxins.

The small size of the Hawaiian population of band-rumped storm-petrels, perhaps not more than a few hundred birds, could be a threat to this species. Small populations are more susceptible to stochastic, genetic, environmental, and demographic events that can lead to extinction (Soule 1987; Lande 1988).

A single human-caused action such as the establishment of mongoose on Kauai, or a natural environmental disturbance such as a hurricane during the breeding season, could cause reproductive failure and could destroy a significant percentage of the known extant individuals.

CONSERVATION MEASURES PLANNED OR IMPLEMENTED

The County of Kauai has recognized the potential threat caused by artificial lighting to other seabirds inhabiting the island (Reed *et al*. 1985). Many resorts have reduced or eliminated problematic lighting, and all public street lights on the island are now shielded to reduce the amount of light that escapes horizontally. A Habitat Conservation Plan is being negotiated with the Kauai Island Utility Cooperative in order to mitigate take of listed seabirds by collisions with utility wires, including Newell's shearwater and Hawaiian petrel. Such actions should also help to reduce impacts to the band-rumped storm-petrel.

SUMMARY OF THREATS (including reasons for addition or removal from candidacy, if appropriate)

Predation by alien animals on nests and adults during the breeding season is the most serious threat to the Hawaiian population of the band-rumped storm-petrel. These predators include feral cats, barn owls, small Indian mongoose, black rats, Polynesian rats, and Norway rats. Attraction of fledglings to artificial lights and collisions with artificial structures such as communication towers and utility lines are also a threat. Erosion of nest sites caused by the actions of alien ungulates is a potential threat in some locations on the island of Kauai. Other potential threats

include commercial fisheries, ocean pollution, and this distinct population segment's small population size and limited distribution. We find that this distinct population segment is warranted for listing throughout all its range, and, therefore, find that it is unnecessary to analyze whether it is threatened or endangered in a significant portion of its range.

For species that are being removed from candidate status:

___Is the removal based in whole or in part on one or more individual conservation efforts that you determined met the standards in the Policy for Evaluation of Conservation Efforts When Making Listing Decisions (PECE)?

RECOMMENDED CONSERVATION MEASURES

- Conduct intensive surveys for breeding colonies
- Conduct at-sea surveys
- Control predators (rats, cats, barn owls, mongoose) at known colonies
- Shield and/or reduce human-made light sources
- Control feral ungulates at known colony sites

LISTING PRIORITY

THREAT			
Magnitude	Immediacy	Taxonomy	Priority
High	**Imminent**	Monotypic genus	1
		Species	2
		Subspecies/population	**3***
	Non-imminent	Monotypic genus	4
		Species	5
		Subspecies/population	6
Moderate to Low	Imminent	Monotypic genus	7
		Species	8
		Subspecies/population	9
	Non-imminent	Monotypic genus	10
		Species	11
		Subspecies/population	12

Rationale for listing priority number:

Magnitude:
The magnitude of threats is high. The most serious threats to the species are already occurring. Alien predators occur throughout the range of the band-rumped storm-petrel, and predation has

drastically reduced the distribution and abundance of the species. As a result, it is now found only in small numbers in remote cliffs and lava fields that are not as accessible to predators. Attraction to artificial lights and subsequent mortality has already been documented, and such lights occur over much of the species' current range.

Imminence:
Threats to the band-rumped storm-petrel are imminent because they are ongoing. Alien predators have been present throughout the Hawaiian Islands for decades and are known to be affecting seabirds, including the band-rumped storm-petrel. The threat from artificial lighting and collisions with artificial structures also is affecting the species currently, and may worsen as the human population of Hawaii increases.

Yes Have you promptly reviewed all of the information received regarding the species for the purpose of determining whether emergency listing is needed?

Is Emergency Listing Warranted? No. The species does not appear to be appropriate for emergency listing at this time because the immediacy of the threats is not so great as to imperil a significant proportion of the taxon within the timeframe of the routine listing process. If it becomes apparent that the routine listing process is insufficient to prevent significant losses that may result in this species' extinction, then the emergency rule process for this species will be initiated. We will continue to monitor the status of the band-rumped storm-petrel as new information becomes available. This review will determine if a change in status is warranted, including the need to make prompt use of emergency listing procedures.

DESCRIPTION OF MONITORING
Assessment of the status of the band-rumped storm-petrel is conducted primarily by compiling results of irregular surveys conducted by Federal, State, and private biologists, and anecdotal observations made by private naturalists. There are no regular field surveys conducted for the band-rumped storm-petrel, but as described above, there have been searches for nesting areas on Kauai, Hawaii, Maui, and Lehua Islet. The most recent surveys were conducted on Kauai in 2004 and 2005 by biologists from the National Tropical Botanical Garden and private biologists (Wood *et al*. 2002; Wood pers. comm. 2005), and on Lehua Islet in 2004 and 2005 by Service, State of Hawaii, and University of Hawaii biologists (VanderWerf *et al*. 2007). Other survey work has been conducted incidentally to surveys for the endangered Hawaiian petrel in Hawaii Volcanoes National Park (D. Hu, pers. comms. 2005, 2007).

The latest species assessment was sent to 10 species experts for review on January 16, 2009 (one reviewer was sent a letter on January 29, 2009), and to inquire if they had any new information relevant to the species. Information was received from one individual (Nick Holmes). Nick Holmes, Trevor Joyce, and Fern Duvall were sent a request on April 12, 2010, for any new information relevant to the species. Nick Holmes and Trevor Joyce provided new survey information which has been incorporated into this form. This level of monitoring is appropriate to update the status of the species because a thorough literature search was conducted as well as relevant species experts contacted.
This species is ranked as "apparently secure" by the Hawaii Biodiversity and Mapping Program

(HBMP) (HBMP 2006), and as a taxon of "least concern" in the International Union for Conservation of Nature and Natural Resources (IUCN) Red Data List database (IUCN 2006), which base their assessments on the status of the species worldwide rather than on the distinct population segment of the Hawaiian Islands. It is listed as a species of greatest conservation need in the State of Hawaii's Comprehensive Wildlife Conservation Strategy (Mitchell *et al*. 2005).

COORDINATION WITH STATES

On February 11, 2010, we provided the Hawaii Division of Forestry and Wildlife with a copy of the latest assessment form for their review and comment. No additional information or comments were received.

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APPROVAL/CONCURRENCE: Lead Regions must obtain written concurrence from all other Regions within the range of the species before recommending changes, including elevations or removals from candidate status and listing priority changes; the Regional Director must approve all such recommendations. The Director must concur on all resubmitted 12-month petition findings, additions or removal of species from candidate status, and listing priority changes.

Approve:

Acting Carolyn A. Bohan 5/18/10
Regional Director, Region 1, Fish and Wildlife Service Date

Rowan W. Gould
ACTING
Director, Fish and Wildlife Service October 22, 2010

Concur:

Do not concur: _____
Director, Fish and Wildlife Service Date

Director's Remarks:

Date of annual review: April 2, 2010
Conducted by: Lorena Wada, Pacific Islands FWO
Biologist, Prelisting and Listing Program

Comments:
PIFWO Review

Reviewed by: Christa Russell Date: April 19, 2010
Prelisting and Listing Program Coordinator

Marilet Zablan Date: April 26, 2010
Assistant Field Supervisor, Endangered Species Division

Gina Shultz Date: April 30, 2010
Acting Field Supervisor